Significance of Increasing the Receive Antenna Height in Reducing Path Loss for Hata Path Loss Model SignificanceofIncreasingtheReceiveAntennaHeightinReducing-PathLossforHataPathLossModel

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Abstract

This letter shows a significant improvement procedure to reduce the path loss for Hata Path Loss model. This can be applied for urban, suburban and open areas in different frequencies. This is completely a software based approach to determine a relation between the path loss and the height of the receiver antenna. Here it is shown that if the height of receiver antenna is increased then the path loss decreases significantly.

Index terms— hata-model, fading, correlation-coefficient, carrier-frequency, wireless-communication, path-loss.

1 Introduction

n wireless communication fading refers to a very unique characteristic. The variation of the signal amplitude over time and frequency is called fading. There are two types of fading, one is large scale fading and the other is small scale fading. Large scale fading comprises of path loss and shadowing. Hata model is one of the most adopted path loss models that can predict path loss in urban, suburban and open area.

Here it is shown that if the height of receive antenna is increased then the path loss decreases significantly.

Here the height of the transmit antenna is set to 30m and carrier frequencies used are 1500 MHz and 200 MHz. As in the urban area there are lots of obstructions like multistoried building or towers, therefore urban area possess more path loss than suburban and open area with the increase of distance between base station and mobile station. Open area have less obstructions and therefore less path loss than urban and suburban area. Now it will be shown that if the height of the receive antenna is increased then the path loss decreases using MATLAB simulation. It can also be said that for same value of transmit and receive antenna height, path loss decreases after reducing the value of carrier frequency. In Fig. 4, when distance is 100 [m] then path losses are around 72, 68 and 49 [dB] for urban, suburban and open area, respectively. But these values decrease in Fig. 5 and Fig. 6 for the same distance. In Fig. 6, path losses become around 47, 0, 0 [dB] for the same distance of 100 [m] which is a significant improvement.

2 Conclusions

[1]

Figure 1:

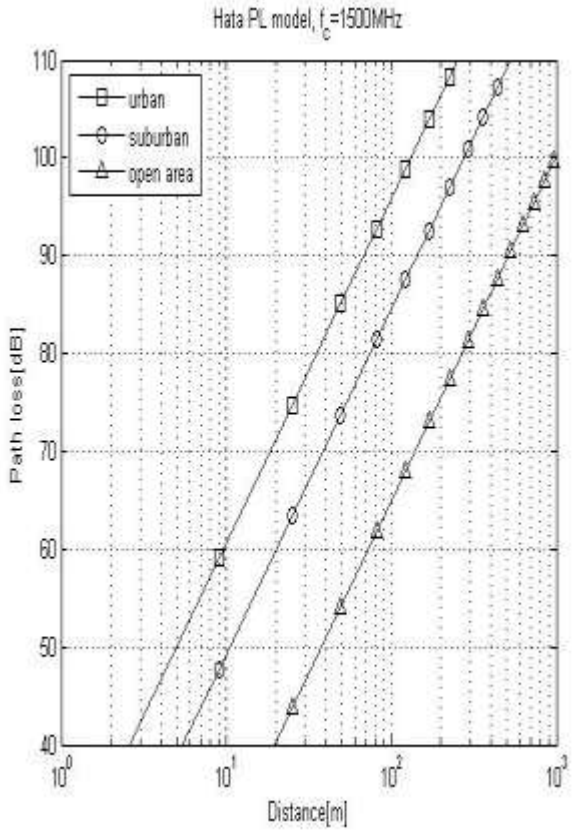

Figure 2:

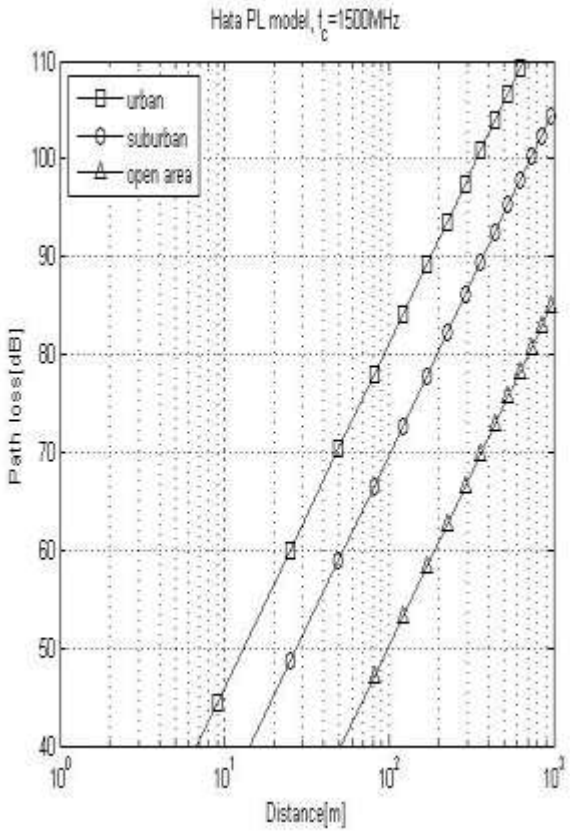

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Figure 3: Figure 1 :Figure 2 :Figure 3 :

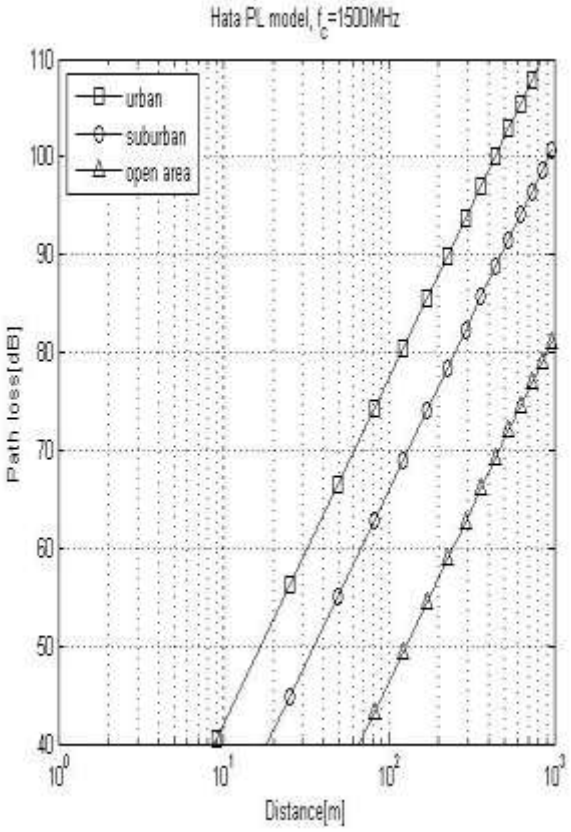

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Figure 4: Figure 4 :

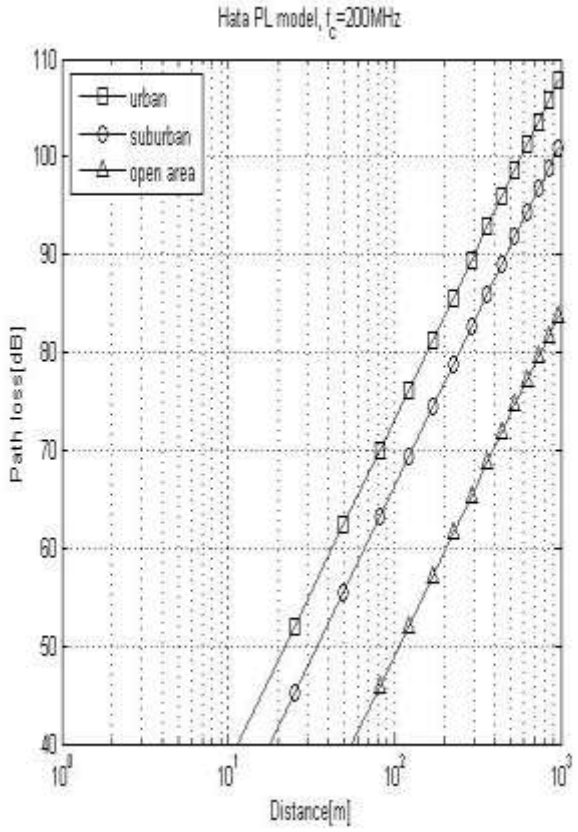

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Figure 5: Figure 5 :

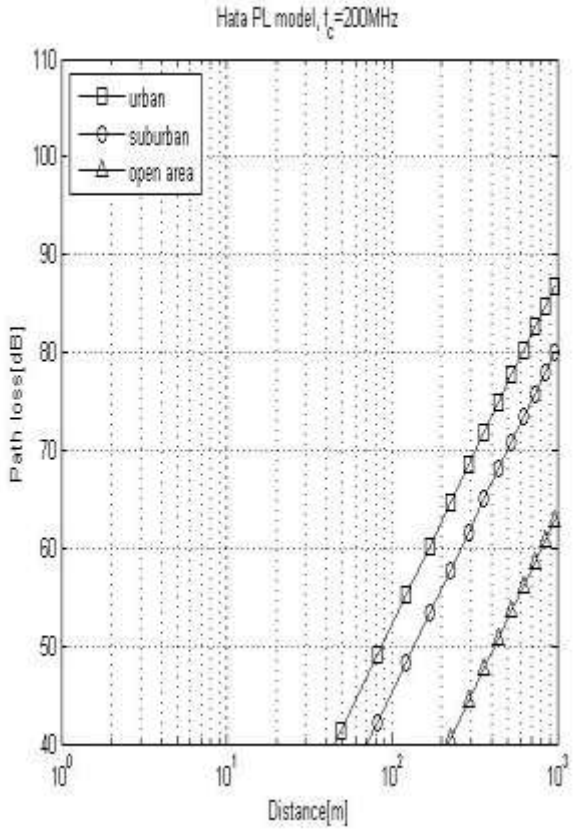

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Figure 6: Figure 6 :

.1 IV .

In this paper we tried to show the relation between the path loss and the height of receive antenna. It is evident that, path loss decreases with the increase of receive antenna's height. But in practice, this is not quite feasible enough in case of our cell phone. Because it is not possible to increase the height of its antenna to a significant amount as it will increase the cell size and weight. That is why sometimes external antennas are provided with the cell phones. So, the height of receive antenna should be increased to reduce the path loss to a significant amount.

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